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GLANDULARITY IN *RUBUS ALLEGHENIENSIS* PORTER¹

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For the past 4 years we have been studying the blackberries of New Hampshire and nearby parts of Maine and Vermont. This was started as a floristic study to determine what taxa occur in New Hampshire and where in the State each is found.

Fernald (1) quoted in part here, has the following to say about the classification of *Rubus* Subgenus *Eubatus* which embraces the Blackberries, "Taxonomically a most difficult group. Our few original wide-ranging, essentially unvarying and ancient species have greatly commingled producing sometimes localized but rapidly spreading offspring . . ." We have assumed as Fernald apparently did from what he stated farther on in this long footnote, that certain of the multitude of species that have been described are of a different order taxonomically from the others.

One of our primary objectives has been to determine which of our species in New Hampshire may be characterized as well-marked. Unquestionably one of the most clearly defined is the one in question here, *Rubus allegheniensis*. It has an extensive range and possesses some taxonomic characters that are recognized readily in the majority of specimens though considerable diversity is displayed in some

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of its features. We have come to be suspicious of the terms "unvarying" or "essentially unvarying" as applied to any wide ranging species of blackberry known to us. A study based on populations more than on individuals seems to lead inevitably to a broader and more inclusive interpretation of the well established taxa in *Rubus*. Since many of the less well-marked species are characterized by features that seem to us to fall within the proper limits of variation of the better defined ones we suggest that eventually there should be a marked reduction in the number of accepted species in the Subgenus *Eubatus*.

This paper presents evidence to show that *Rubus allegheniensis* has been interpreted too narrowly in respect to its glandularity. This should make it possible for more effective use to be made of Fernald's key to the Section *Alleghenienses* (2) by changing some of the statements there. At present, with many specimens, the key is quite unworkable if followed literally, and therefore, in our opinion, needs to be corrected. The first major division of the key is concerned with glandularity of the primocanes. We note the following statements, "axis of primocane (except sometimes at expanding tip) without or essentially without stipitate glands on the internodes or among the prickles" contrasted to "axis of primocane bearing several to very many long stipitate glands among the prickles." Four New England species thus are distinguished from *R. allegheniensis* by having glandular primocanes. Of these only one, *R. ravus* Bailey, is stated in the key to have long cylindric racemes of flowers, in this respect resembling *R. allegheniensis*. In using the key let us assume that a specimen is found to occur in the Section *Alleghenienses*; if it has evident glands on the mature primocanes and in addition has its flowers in well-developed racemes, the specimen will be identified in the key as *R. ravus* rather than *R. allegheniensis*. One would also have trouble getting by the first statement in the key in L. H. Bailey's treatment of *Rubus* (3) which, in part at least, seems to have served as a model for the key in Gray's Manual.

For many years we have been confused by these keys, a major difficulty being that much material, at least in Northern and Central New England, has glands on the mature primocanes and yet in other ways fits *R. allegheniensis*. *R. rarus* is an excessively prickly and glandular taxon of localized occurrence. We don't at present have convincing evidence that it is a good species. In herbaria it is represented from only a few localities but recent field observations and collections by us indicate it to be of occasional occurrence, though it may be widespread. The material to be discussed below resembles *R. rarus* only in having glands on the primocanes and by having more or less elongated racemes. Except for the glandular primocanes, there would certainly be no hesitancy about calling all of these specimens *R. allegheniensis*.

In 1953 the junior author made some observations of a colony of *R. allegheniensis* in Sandwich, New Hampshire. In the middle of June it was noted that all of the primocanes in the colony, which had not then reached full growth, were heavily glandular. Collections made from the colony at weekly intervals indicated that the glands tended to disappear as the canes matured. A rather dense pubescence remained on the primocanes of this particular colony. Since 1951 the senior author frequently has collected specimens which have the characteristics of *R. allegheniensis* except that they have noticeable glands on the primocanes. At first he was inclined to call these *R. rarus* but glandular plants occurred so often and these had such varying numbers of glands that a very different explanation was suggested. These observations thus impelled us to undertake a systematic study of gland-occurrence on the primocanes of *R. allegheniensis*.

Collections of 10 primocanes were made from each of 9 colonies in different localities in New Hampshire and from one in southern Maine between the dates of July 15 and November 11, 1959. These colonies were selected entirely without regard for glandularity. The colonies were all vigorous, consisting of well-grown primocanes and flori-

canes intermixed. Since the canes in each colony grew in close proximity, it was thought that in many of the colonies the canes were genetically similar, having arisen from the same single rootstock. Sections about 30 cm. long were collected; these were taken from about the middle of full-sized primocanes. The attempt was made to distribute the collecting somewhat uniformly throughout each colony. The stands ranged in size from 20 or 30 square metres down to stands that barely yielded 10 primocanes for our study.

The results of counts of glands are shown in Fig. 1; 35% of the plants fell in the class of less than 100 glands per decimeter and therefore, compared with heavily glandular stems, might be considered as essentially without glands though it is to be noted that they are still fairly obvious under 10X magnification down to fewer than 50 per decimeter. The matter of glandularity then can become important subjectively, depending on the diligence with which one searches for glands, also the quality of lens used and the interpretation of what is meant by the phrase "essentially without glands." Assuming that any condition fewer than 100 glands per decimeter may fit the requirement of *R. allegheniensis* of relative glandlessness, we were left with 65% of the canes, including at least 2 from each colony and all of them from one, which had more than 100 glands per decimeter — certainly enough to notice and to create doubt and confusion when trying to use the key. In 7 of the colonies one or more canes had more than 500 glands per decimeter, a situation which could hardly be ignored by any critical observer. Of considerable interest is the variation in glandularity within any particular colony. Some of the colonies almost certainly were from common rootstocks. Yet all displayed some differences between canes and 6 of the colonies had markedly different numbers of glands on most of their canes. Many questions and unsolved problems are suggested by these data.

Because of some of the questions raised in this study, a canvass was made of readily available herbarium specimens to find out if the results noted in New Hampshire and

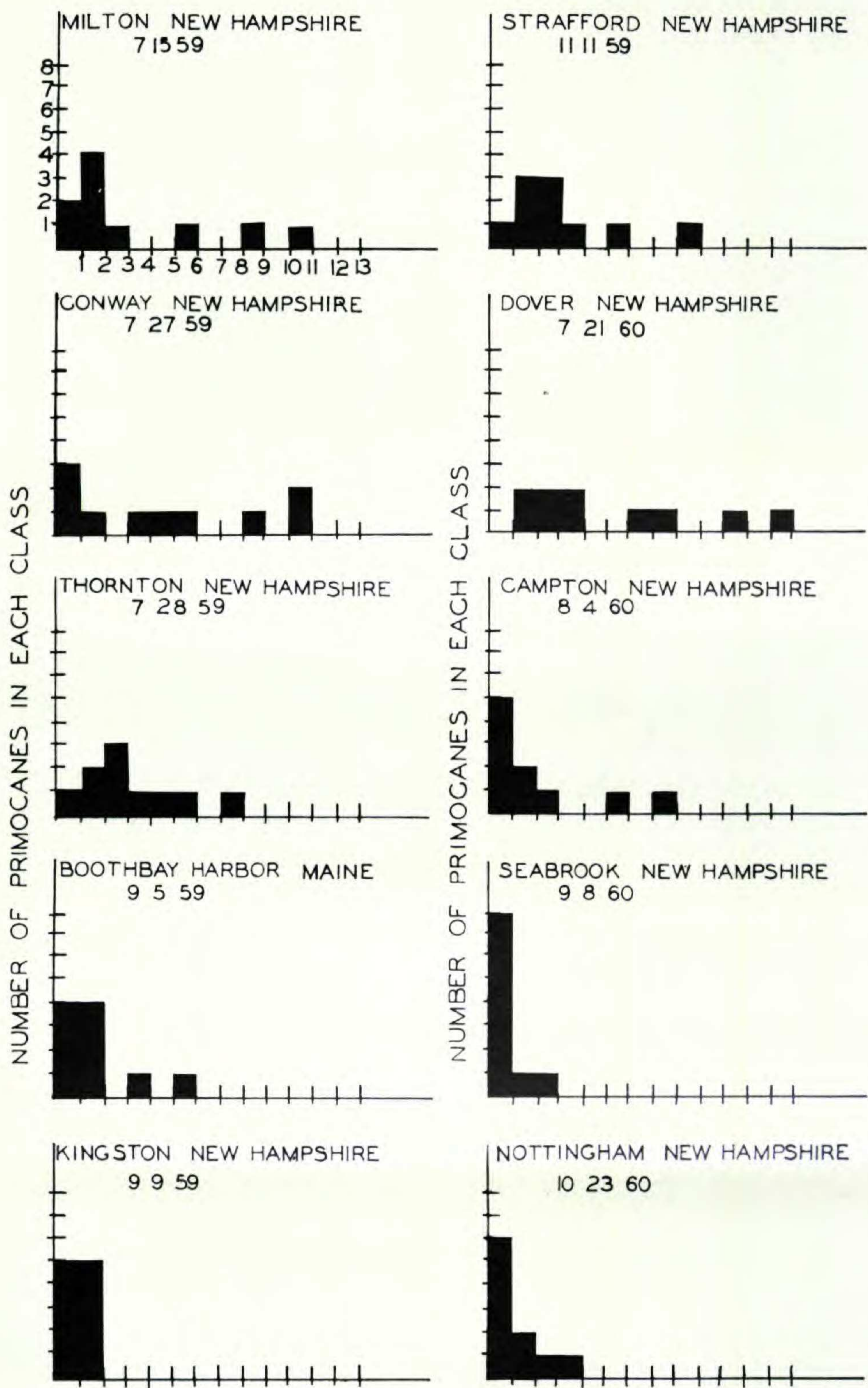


Fig. 1. Frequency distribution of numbers of glands in *Rubus allegheniensis*.

southern Maine might be expected elsewhere in the range of the species. Unfortunately, many herbarium specimens of blackberries are quite useless for critical study, lacking either floricanes or primocanes and often without growth-habit notes. In addition, young primocanes collected at the time of flowering tend to give an unfair impression of glandularity. Nonetheless a sufficient number of good specimens were available in the Gray Herbarium and the herbarium of the New England Botanical Club, as well as the University of New Hampshire collection and the private collection of the junior author to give us a more general picture. Table 1 summarizes the data on primocane glands as best it could be determined from the aforementioned herbaria. From outside of New England and particularly from the southern parts of the range the specimens available were few and mostly inadequate in that frequently they lacked good primocanes. Similar field and herbarium studies of *R. allegheniensis* should be carried out in areas other than New England to provide a more complete analysis of glandularity in this species. A glance at some specimens from the Maritime Provinces of Canada indicated that we might expect to find considerable glandularity there.

Table 1. — Glandularity in Herbarium Material of *R. allegheniensis*
Numbers of primocanes in classes based on
number of glands per decimeter.

Location	0-99	100-199	200-299	300-399	400-499	more than 500
Maine	11	3	2	0	1	5
New Hampshire	38	10	6	8	5	10
Other New						
England States	5	5	—	4	2	3
States other than						
New England	21	2	2	1	3	1

From the table we see that slightly more than half of the primocanes are relatively glandless with fewer than 100 glands per decimeter, this being considerably more than in our population samples. It is evident however that, in most parts of the range, there would be specimens to cause perplexity and confusion when using the key. In states other

than New England most of the heavily glandular specimens came from the northern tier of states. If diminished glandularity is partly a function of development, it might be that the longer growing period of the more southern parts of the range may contribute to a reduction in glands. Though not shown in the table, entirely glandless specimens constituted only a minor proportion of the primocanes in herbarium specimens.

The var. *neoscoticus* Fernald of *Rubus allegheniensis* is interpreted by Bailey (4) as being glandular, though this character is ignored in Fernald's handling of it in Gray's Manual. Our glandular specimens definitely do not fit this variety.

In the Harvard Herbarium an examination was made of sheets of the supposedly glandular species of Section *Alleghenienses* including *R. ravus* Bailey, *R. glandicaulis* Blanch., *R. frondisensis* Blanch. and *R. sceleratus* Brainerd. The typical plants of these were not only heavily glandular with 1,500 or, more frequently, 2 or 3,000 or more glands per decimeter but differed also in character of armature, the prickles in some cases being thin and acicular and in others broad-based but very abundant.

Bailey in Gentes Herbarium makes a more satisfactory separation of *R. ravus* and the other very glandular species than does Fernald in that he takes the accompanying armature into consideration. As a substitute for the primary divisions of the key to the Section *Alleghenienses* (2), we suggest that the following be used:

Mature primocanes with none or few glands or only moderately glandular (0-1200 per dm.) along with few to many stiff broad-based prickles.

Mature primocanes with numerous glands (1500-5000 per dm.) along with many bristles or slender prickles or exceptionally broad-based prickles, the prickles if broad-based, abundant and almost contiguous.

Many of the taxa in the very glandular group appear to be hybrids with an admixture of *R. setosus* or to show introgression with that species.

Specimens of primocane and voucher material used in the population studies have been placed in the University of New Hampshire Herbarium.

The authors wish to thank the curators of the Harvard Herbarium and the New England Botanical Club Herbarium for their permission to consult these collections freely.
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FIFTEENTH REPORT OF THE COMMITTEE ON PLANT DISTRIBUTION

The fourteenth report included the Dicotyledoneae from Papaveraceae through Platanaceae. The present report deals with the genus *Carex* of the Cyperaceae.

The data for these reports have been compiled from the material found in the herbarium of the New England Botanical Club, in the Gray Herbarium, and in the herbarium of the Peabody Museum at Salem.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS — XL

The sign + indicates that an herbarium specimen has been seen, the sign — that a reliable printed record has been found and the sign * is used for those plants which are not native in the New England area.

CYPERACEAE

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
<i>Carex abdita</i> Bickn.	+	+	+	+	+	+
<i>Carex abscondita</i> Mackenz.		+		+	+	+
* <i>Carex acutiformis</i> Ehrh.				+		